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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/726,899	11/29/2000	Olga Bandman	PF-0187-2 DIV	3562

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EXAMINER
ROARK, JESSICA H

ART UNIT	PAPER NUMBER
1644	8

DATE MAILED: 01/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/726,899	Applicant(s) BANDMAN ET AL.	
	Examiner Jessica H. Roark	Art Unit 1644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 October 2002 and 22 November 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *12 and 13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on *29 November 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

RESPONSE TO APPLICANT'S AMENDMENT

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/22/02 and directing entry of the amendment previously filed 10/30/02 has been entered.

2. Applicant's amendment, filed 10/30/02 (Paper No. 14), is acknowledged and has been entered.
Claim 14 has been cancelled.
Claims 1, 3 and 6 have been amended.
Claims 1-13 *are pending.*

3. Claims 1-11 with respect to SEQ ID NOS:1, 5 and 7, and claims 12-13 in full are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction requirement in Paper No. 4.

Applicant's continued traversal of the restriction requirement and request for rejoinder are acknowledged.

The restriction requirement was made Final in Paper No. 6 for the reasons set forth therein.

Claims 1-11 (only with respect to SEQ ID NO:3) *are under consideration in the instant application.*

In order to facilitate the prosecution of this application, Applicant is requested to consider amending the claims to delete the non-elected embodiments from the claims.

4. This Office Action will be in response to applicant's arguments, filed 10/30/02 (Paper No. 14). The rejections of record can be found in previous Office Actions (Paper Nos. 6 and 9).

It is noted that New Grounds of Rejection are set forth herein.

Specification

5. Applicant's amendment, filed 10/30/02 has obviated the previous objection to the specification as failing to provide proper antecedent basis for the claimed subject matter of claims 3 and 6.

Claim Rejections - 35 USC § 112 first paragraph

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1-2 and 9-11 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for an antibody to the full length polypeptide of SEQ ID NO:3 or an immunogenic fragment thereof; does not reasonably provide enablement for an antibody to a polypeptide comprising a "naturally-occurring amino acid sequence at least 90% identical to the full length of the sequence of SEQ ID NO:3" wherein said naturally-occurring amino acid sequence supports NADH dehydrogenase activity. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Applicant's arguments, filed 10/30/02 have been fully considered. Applicant argues that the instant claims now recite a testable function and that the rejection of record should therefore be withdrawn.

However, even in view of a testable activity for those polypeptides that are "naturally-occurring" variants of SEQ ID NO:3 comprising at least 90% identity over the full length of SEQ ID NO:3, the specification still does not appear to provide sufficient guidance such that the skilled artisan is enabled to make and use an antibody to those polypeptides commensurate in scope with the instant claims.

The specification discloses a single working example of a polypeptide that is naturally-occurring and has at least 90% identity to SEQ ID NO:3: the polypeptide of SEQ ID NO:3. In view of the disclosed sequence of SEQ ID NO:3 and its credible function as a subunit of NADH dehydrogenase, the skilled artisan would be enabled to make and use an antibody to the polypeptide of SEQ ID NO:3 or immunogenic fragments thereof, as acknowledged previously. Nevertheless, there is insufficient guidance in the specification as-filed to direct a person of skill in the art as to how to make and use antibodies to a polypeptide comprising a "naturally-occurring" amino acid sequence at least 90% identical to the full length of the sequence of SEQ ID NO:3 even wherein said naturally-occurring amino acid sequence supports NADH dehydrogenase activity.

Applicant does not appear to have provided sufficient guidance with respect to "naturally-occurring" polypeptides and how to make and use antibodies to them. Although the specification does provide some general guidance as to how to isolate other nucleic acids related to the nucleic acid encoding SEQ ID NO:3 and then test those polypeptides encoded by the related nucleic acids for NADH dehydrogenase function (e.g., pages 50-52), it is unpredictable that other "naturally-occurring" polypeptides having NADH dehydrogenase activity and at least 90% amino acid sequence identity to SEQ ID NO:3 exist.

Reasonable correlation must exist between the scope of the claims and scope of enablement set forth. Applicant does not appear to provide sufficient guidance as to other sources of "naturally-occurring" polypeptides which are at least 90% identical to SEQ ID NO:3 and have NADH dehydrogenase activity. The state of the art did not recognize other "naturally-occurring" polypeptides that had NADH dehydrogenase activity and were at least 90% identical to SEQ ID NO:3. Even though the level of skill in the art for isolating "naturally-occurring" polypeptides encoded by nucleic acids related to the nucleic acid encoding SEQ ID NO:3 may have been high with respect to the techniques employed, skill in the art does not render the existence of a "naturally-occurring" polypeptide predictable.

The presence of a single working example and the failure of the state of the art either at the time of filing or since to recognize other "naturally-occurring" polypeptides at least 90% identical to SEQ ID NO:3 and having NADH dehydrogenase activity indicates that it was highly unpredictable that additional polypeptides meeting these limitation could be isolated, particularly based on the limited guidance provided in the specification as filed. Unlike the fact pattern of In re Wands, 858 F.2d at 737, 8 USPQ2d at 1404 (Fed. Cir. 1988) where the presence of a hybridoma producing an antibody having the desired properties among the many hybridomas was predictable, in the instant case it is not predictable that other "naturally-occurring" polypeptides exist. Therefore, the experimentation left to those skilled in the art is unnecessarily, and improperly, extensive and undue with respect to other "naturally-occurring" polypeptides other than SEQ ID NO:3.

Consequently, a person of skill in the art is not enabled to make and use an antibody to a "naturally-occurring" polypeptide at least 90% identical to SEQ ID NO:3 and having NADH dehydrogenase activity; as encompassed by the full breadth of the claims as currently recited, irrespective of the particular form of the antibody (polyclonal, monoclonal, etc.).

8. Claims 1-2 and 9-11 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The following *written description* rejection is set forth herein.

The claims recite as part of the invention the following:
an antibody which specifically binds a polypeptide comprising a "naturally-occurring amino acid sequence at least 90% identical to the full length of the sequence of SEQ ID NO:3" wherein said naturally-occurring amino acid sequence supports NADH dehydrogenase activity.

A polypeptide comprising the amino acid sequence of SEQ ID NO:3 is adequately described in the specification as-filed, thereby providing an adequate written description of an antibody which specifically binds the polypeptide of SEQ ID NO:3 or immunogenic fragments thereof.

A polypeptide comprising a "naturally-occurring amino acid sequence at least 90% identical to the full length of the sequence of SEQ ID NO:3" wherein said naturally-occurring amino acid sequence supports NADH dehydrogenase activity is a recitation of a genus of polypeptides for which Applicant has disclosed a single species: the polypeptide of SEQ ID NO:3. The claim recites that the polypeptide to which the antibody binds is "naturally-occurring" and has a testable function of "NADH dehydrogenase activity". The specification proposes that other members of the "naturally-occurring" polypeptide genus may be identified by using hybridization probes to identify DNAs or RNAs related to the nucleic acid encoding SEQ ID NO:3, expressing the polypeptide, and assaying the polypeptide for NADH dehydrogenase activity (see pages 50-52 in particular).

However, Applicant does not appear to have provided a description of which polypeptide sequences are "naturally-occurring", even among those polypeptides at least 90% identical to the full length of the sequence of SEQ ID NO:3. Neither does Applicant appear to have provided a description of how the structure of the polypeptide of SEQ ID NO:3 relates to the structure of other "naturally-occurring" polypeptides which have NADH dehydrogenase activity, even for those polypeptides at least 90% identical to the full length of the sequence of SEQ ID NO:3. Thus neither the common attributes of the genus nor the identifying attributes of individual species other than SEQ ID NO:3 appear to have been described.

One of skill in the art would conclude that Applicant was not in possession of the claimed genus of polypeptides comprising a "naturally-occurring amino acid sequence at least 90% identical to the full length of the sequence of SEQ ID NO:3" wherein said naturally-occurring amino acid sequence supports NADH dehydrogenase activity. Since Applicant does not appear to have been in possession of the genus of polypeptides to which the instantly recited antibody specifically binds; Applicant in turn does not appear to be in possession of the genus of antibodies specifically binding these polypeptides.

Therefore, only an antibody to SEQ ID NO:3 or immunogenic fragments thereof meet the written description provision of 35 U.S.C. 112, first paragraph. Vas-Cath Inc. v. Mahurkar, 19 USPQ2d 1111, makes clear that "applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. The invention is, for purposes of the written description inquiry, whatever is now claimed." (See page 1117.) The specification does not "clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed." (See Vas-Cath at page 1116.). Consequently, Applicant was not in possession of the instant claimed invention. See University of California v. Eli Lilly and Co. 43 USPQ2d 1398.

Applicant is directed to the Guidelines for the Examination of Patent Applications Under the 35 U.S.C. 112, ¶ 1 "Written Description" Requirement, Federal Register, Vol. 66, No. 4, pages 1099-1111, Friday January 5, 2001.

Applicant is invited to point to clear support or specific examples of the claimed invention in the specification as-filed.

35 U.S.C. §§ 102 and 103

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Bentlage et al. (Biochimica Biophysica Acta 1995; 1234:63-73, of record).

Applicant's arguments, filed 10/30/02, have been fully considered but have not been found convincing, essentially for the reasons of record in Paper Nos. 6 and 9.

Applicant argues that because the claims require that the antibody specifically bind a particular sequence, the instant claims are not anticipated by the teachings of Bentlage et al.

As previously noted, Bentlage et al. teach a polyclonal antibody that binds a 15kD protein of human Complex I (see entire document, especially Section 2.4 and Figure 4a, arrowheads). Although the polypeptide of 15kD recognized by the antibodies was not shown to comprise SEQ ID NO:3; the molecular weight is consistent with that of the polypeptide of SEQ ID NO:3, and the polypeptide is part of human Complex I which is comprised of SEQ ID NO:3. Therefore, the antibodies taught by Bentlage et al. anticipate an antibody which specifically binds the polypeptide comprising the amino acid sequence of SEQ ID NO:3. *SEQ ID NO:3 would be an inherent property of the polypeptide recognized.*

It is further noted that this rejection does not necessarily rely on the fact that an antibody may specifically bind more than one polypeptide that shares the epitope recognized by the antibody, although as discussed more fully in Paper No. 9 such binding is indeed still specific. Rather, Bentlage et al. teach an antibody that based upon the evidence provided in Bentlage et al., appears to bind the instantly recited polypeptide of SEQ ID NO:3.

Further, the polypeptide bound by the antibody of Bentlage et al. would inherently function as a NADH dehydrogenase, as evidenced by the fact that, as taught by Bentlage et al., the polypeptide is part of human Complex I and has the same size as the polypeptide of SEQ ID NO:3.

Applicant is reminded that "[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F. 2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). (See MPEP 2112 and 2112.01).

The reference teachings thus anticipate the instant claimed invention.

The rejection is maintained for the reasons of record in Paper No. 6 as discussed in Paper No. 9.

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walker et al. (J. Mol. Bio. 1992;226:1051-1072, IDS #2), in view of Bentlage et al. (Biochimica Biophysica Acta 1995; 1234:63-73, of record), and in further view of Ramakrishnan et al. (US Pat No. 5,817,310, of record).

Applicant's arguments, filed 10/30/02, have been fully considered but have not been found convincing, essentially for the reasons of record.

Applicant argues that because the claims require that the antibody specifically bind a particular sequence, the instant claims are not rendered obvious by the teachings of the references.

This argument has been addressed previously and is not impacted by the instant amendments to the claims. The rejection of record is re-iterated below.

The claims are drawn to various forms of an antibody which specifically binds to a polypeptide of SEQ ID NO:3, or to a naturally-occurring polypeptide having at least 90% identity to the polypeptide of SEQ ID NO:3 and NADH dehydrogenase activity; as well as to method of producing these antibodies.

Walker et al. teach a bovine B15 sequence of NADH:Ubiquinone oxidoreductase (see entire document, e.g., Abstract). The B15 polypeptide has 75.8% identity to the polypeptide of SEQ ID NO:3 as shown by the following (Smith-Waterman) alignment:

```
Query Match 75.8%;  Score 514;  DB 2;  Length 129;
Qy      1 MSFPKYKPSSLRTLPETLDPAEYNISPETRRAQAERLAIRAQLKREYLLQYNDPNRRGLI 60
          |||||||: | | :|| |||||||:|| |||:||||||||::||||| ||| ||:|||:|
Db      1 MSFPKYEASRLSSLPTTLDPAEYDISSETRKAQAERLAIRSRLKREYQLQYYDPSRRGVI 60

Qy     61 ENPALLRWAYARTINVYPNFRPTPKNSLMGALCGFGPLIFIYYIIKTERDRKEKLIQEGK 120
          |:|||:|| |||: |:|||||| | ||:||| | |||:| ||: ||:||||||||||||
Db     61 EDPALVRWTYARSANIYPNFRPNTKTSLLGALFGIGPLVFWYYVFKTDRDRKEKLIQEGK 120

Qy    121 LDRTFHLSY 129
          |||||::||
Db    121 LDRTFNISY 129
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In addition to having 75.8% identity, the B15 polypeptide and SEQ ID NO:3 shares several stretches of amino acid identity that are 5 amino acids in length or greater. Thus the B15 polypeptide and the polypeptide of SEQ ID NO:3 share numerous antibody epitopes. Walker et al. also teach the purification of the B15 polypeptide (e.g., 1057, 1st paragraph).

Walker et al. do not teach antibodies to the B15 polypeptide, or to the polypeptide of SEQ ID NO:3; nor does Walker et al. teach methods of producing antibodies.

Bentlage et al. teach antibodies and methods of producing polyclonal antibodies to polypeptide components of NADH dehydrogenase (see entire document, e.g., Abstract). Antibodies to both purified polypeptide, or to peptide fragments, are taught (e.g., see Section 2.4). Bentlage et al. teach that NADH dehydrogenase is a multi-subunit protein also known as Complex I (e.g., see Introduction on page 63). Bentlage et al. teach that antibodies against Complex I subunits are very useful for studying the molecular basis of mitochondrial encephalomyopathies (e.g., see Introduction and Discussion). Finally, Bentlage et al. teach that antibodies produced using bovine Complex I as an immunogen react specifically with the corresponding polypeptides from human Complex I (see especially Section 2.4 and Figure 4a, arrowheads).

Ramakrishnan et al. teach methods of preparing antibodies and pharmaceutical compositions comprising antibodies in a variety of forms (see entire document, especially columns 8-15). Methods of producing polyclonal antibodies are taught (e.g. column 11, especially lines 60-65). Methods of making monoclonal antibodies are also taught (e.g. column 12). Methods of producing antibodies by screening a recombinant immunoglobulin library which encode either the antibodies or fragments thereof (i.e. Fab) (e.g., see column 12 at line 56 to column 13). In addition, Ramakrishnan et al. teach methods of producing a chimeric antibody (see especially column 14). Finally, Ramakrishnan et al. teach that antibodies can be single chain antibodies, Fab fragments, or $F(ab')_2$ fragments (see e.g. column 9 at lines 9-27). Compositions comprising antibodies in a pharmaceutically acceptable carrier, and various art recognized applications of antibodies for therapy, diagnosis, and detection are taught in columns 15-17.

Thus the references teach that a highly homologous bovine sequence was known to the ordinary artisan at the time the invention was made. The references further teach that the ordinary artisan at the time the invention was made knew that antibodies produced to either bovine Complex I polypeptides, or fragments thereof, would specifically bind the corresponding human Complex I polypeptide of SEQ ID NO:3. The references also teach that the ordinary artisan at the time the invention was made could produce antibodies to polypeptides of interest in any of a variety of forms.

Therefore, it would have been obvious to the ordinary artisan at the time the invention was made to prepare antibodies in any of a variety of forms (polyclonal , monoclonal, etc.) to the bovine B15 polypeptide, or a fragment thereof; with a reasonable expectation that such antibodies would specifically bind the human polypeptide comprising SEQ ID NO:3. Given the teachings of Bentlage et al. that antibodies were known to be very useful for studying diseases related to defects in Complex I subunits; the ordinary artisan would have been motivated to produce antibodies to B15 and use their ability to specifically bind the corresponding human polypeptide for studies of human Complex I-associated diseases. Since methods of producing antibodies to either polypeptides or polypeptide fragments were well known in the art at the time the invention was made; the ordinary artisan would have had a reasonable expectation of success in producing such antibodies. Finally, the ordinary artisan would have been motivated to formulate the antibody in a composition comprising a pharmaceutically acceptable carrier such a PBS or water for use in any of a variety of detection assays. Therefore, the invention as a whole was prima facie obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

The rejection is maintained for the reasons of record in Paper No. 6, as discussed in Paper No. 9.

Conclusion

13. No claim is allowed.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessica H. Roark, whose telephone number is (703) 605-1209. The examiner can normally be reached Monday to Friday, 8:00 to 4:30. A message may be left on the examiner's voice mail service. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Chan can be reached at (703) 308-3973. Any inquiry of a general nature or relating to the status of this application should be directed to the Technology Center 1600 receptionist whose telephone number is (703) 308-0196.

Papers related to this application may be submitted to Technology Center 1600 by facsimile transmission. Papers should be faxed to Technology Center 1600 via the PTO Fax Center located in Crystal Mall 1. The faxing of papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CM1 Fax Center telephone number is (703) 305-3014.

Jessica Roark, Ph.D.
Patent Examiner
Technology Center 1600
January 30, 2003

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1/30/03